The views expressed in this paper are those of the
author and do not necessarily reflect the views of the
Department of Defense or any of its agencies. This
document may not be released for open publication until
it has been cleared by the appropriate military service or
government agency.

# DISTANCE LEARNING: COMING TO GRIPS WITH COURSEWARE DESIGN AND DEVELOPMENT

## BY

COLONEL SHARON L. HOLMES
United States Army

SENIOR SERVICE COLLEGE FELLOW
AY01

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

# DISTANCE LEARNING:
## COMING TO GRIPS WITH COURSEWARE DESIGN AND DEVELOPMENT

by

COLONEL SHARON L. HOLMES
Department of the Army

Jerry G. Davis, Ph.D.
Project Advisor

U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

# ABSTRACT

AUTHOR:     Colonel Sharon L. Holmes

TITLE:        Distance Learning: Coming to Grips with Courseware Design and Development

FORMAT:     Strategy Research Project

DATE:        10 April 2001       PAGES: 54       CLASSIFICATION: Unclassified

The United States Army has experienced numerous changes since the end of the Cold War – significant downsizing and force restructuring, shrinking budgets, reduced equipment modernization, phenomenal growth in mission deployments, and the incorporation of the Guard and Reserves as integral components of the force. These events as well as others have served as a catalyst for "transforming" our Army. This transformation, which will ultimately produce the Objective Force, will result in a more responsive, deployable, lethal, and survivable force. At the core of the transformation's success stands training, which must also transform in order to meet the requirements of today's military environment. Critical to this success is the integration of technology, specifically distance learning. This paper explores how distance learning is defined, the direction the Department of Defense and the Department of the Army are taking regarding distance learning, and the components that make up a distance learning system. The paper will then focus on courseware design and development, concentrating on identifying recommendations that might be used to compliment, supplement or augment the Army's distance learning courseware development program.

## TABLE OF CONTENTS

# LIST OF ILLUSTRATIONS

# DISTANCE LEARNING:
## COMING TO GRIPS WITH COURSEWARE DESIGN AND DEVELOPMENT

> Training and education are essential to maintaining our decisive battlefield edge. The training that our soldiers go through to be proficient in warfighting skills gives them a tremendous advantage on the battlefield and makes America's Army the greatest army the world has ever known. To keep that edge, however, now more than ever before, we must have soldiers developing new technical skills and the capabilities to fight and win on future battlefields and in the diverse missions of tomorrow. This is why our ongoing emphasis on investing in the individual soldier's education is the cornerstone of our vision.
>
> —Louis Caldera, Secretary of the Army

Yesterday the world consisted of two super powers – today only one remains. A mutual understanding between these two powers of their respective strategic capabilities fostered a long period of relative international stability. Focused on potential Warsaw Pact adversaries, the U.S. Army rarely deployed elsewhere in the world in support of military operations other than war or lesser conflicts. The fall of the Berlin Wall changed the focus of our strategic interests. In the absence of a superpower threat and influenced by the euphoria of victory, it was believed there was no longer a need to maintain a large defense structure. In the ensuing budget struggle over the "peace dividends" the Army lost significant force structure and operating and modernization dollars. The reality of the past decade has been radically different from the vision of the early 1990's. Missions and deployments have increased and the need for modernization and transformation has become paramount. Inherent to the new roles and missions and the modernization and transformation is the successful education and training of the military's personnel. This paper examines the role of distance learning, and in particular the issues of courseware design and development, in creating the land force of the twenty-first century.

## THE STRATEGIC ENVIRONMENT CONFRONTS LEADERS

Rather than becoming safer and more stable, the world is increasingly unpredictable as the U.S. seeks to achieve the three core objectives of its National Security Strategy: "enhancing America's security, bolstering America's economic prosperity, and promoting democracy and human rights abroad."[1] During the past decade the U.S. exercised her national power in numerous circumstances other than war, such as the conflicts between India and Pakistan and North and South Korea, and conducted military operations in the Middle East, Bosnia, Kosovo, and Africa. Compounding our traditional national security challenges are the growing threats of terrorism, narco-trafficking, organized crime, and the proliferation of weapons of mass destruction.

Today's global security environment has become increasingly more complex over the past decade as the U.S., believing the threat to be minimal, scaled back defensive forces. For "Fiscal Year (FY) 1999, Department of Defense (DoD) budget authority was, in real terms, about 40 percent below its level for 1985. As a share of America's gross domestic product, FY 1999 DoD budget outlays were about 3 percent, well below average levels during the past five decades."[2] During this same period, our weapons, command and control systems, and truck fleet aged to a point where modernization was critical but budget outlays fell short of the requirement. As a result, the Army spent approximately $5,000 less per soldier for modernization in FY 2000 than it did prior to FY 1989.[3] Concurrently, the number of personnel in uniform was also seriously decremented. The Army's share of that force structure consisted of approximately 1.2 million Active Component (AC), Army National Guard (ARNG), United States Army Reserve (USAR), and Army civilians at the end of FY 1999.[4] At the same time, due to a rather uncertain world as well as changing strategic interests, the Army is now tasked to play a multitude of different roles and accomplish a variety of missions

with a corresponding increase in operational tempo (OPTEMPO). The Army's missions have significantly expanded and now range from nation-building to peacekeeping, as well as potential war fighting. The average frequency of Army contingency deployments has increased from one every four years to one every fourteen weeks, ranging from brief to ongoing commitments.[5]

The Army has, as a result of these worldwide commitments and internal changes, begun a transformation to a lighter, more survivable, and lethal force. A tremendous amount of research and development is ongoing in order to provide the technologies required of a lighter and rapidly deployable force. At the core of this transformation is the exploitation and successful integration of advanced training technologies and associated training courseware that will prepare soldiers at all levels for the newly developed organizational and operational concepts, force concept mixes, and modern equipment required to execute future mission requirements. Furthermore, this era of diminishing defense resources and increased global threats, has promoted the integration of the ARNG and USAR into real world missions as critical and essential force multipliers. These integration efforts are full-spectrum and currently encompass many of the same roles, missions, and multi-functional tasks performed by the AC, such as the Bosnia peacekeeping operations recently performed by the Texas ARNG.

Achieving the tenets of The Army Vision and Joint Vision 2010/2020 requires all three components of the Army to be superbly trained to one training standard. Training readiness is tantamount to the maintenance of any army's proficiency and war fighting edge. Based on the variety of missions and roles now performed, the skills of our soldiers and leaders have become increasingly more technical and multi-functional. The maintenance of training readiness programs and the training of multi-functional skills becomes more imperative as new doctrine, organizational force structures, and

3

modernized/new equipment of the forthcoming interim and objective forces are identified, developed, and implemented.

Yet, a paradox exists – if the Army embarks on a modernization program and buys the technology required to support the transformation, the dollars no longer exist to support education/training in the traditional manner. Since the Army's transformation is no longer "if" but rather "when", strategic leaders are looking at distance learning as a means of bridging the resource gap.

## MILITARY EDUCATION/TRAINING AND A ROLE FOR DISTANCE LEARNING

The training and education of the Army's leaders and soldiers has always been emphasized, supported, and reinforced in the Army. During the Revolutionary War, General Baron Friedrich von Steuben was tasked with bringing order and discipline to the forces.[6] His primary mission was to train the soldiers in the principles of drill and maneuvering in order to provide them with the skills necessary to defeat the enemy. Many years later, the first post schools were established with the enactment of an 1866 statute, whose stated purpose was "to educate the soldier, so as to produce efficient noncommissioned officers, as well as trained and intelligent privates".[7] Then in 1917, the Quartermaster School introduced correspondence courses for officers – a means for their officers to be able to "study at a distance."[8]

Little has changed over the years as to the value, importance, and emphasis the Army places on training and education. The value and importance of the professional development of our leaders and soldiers, as well as the maintenance of a high state of training readiness are tantamount to success on the battlefield. Today our need for educated soldiers is just as great, possibly more so, than in the early years of the profession. With entry and transition into the information age, there is explosive growth in the Nation's technological sectors and its ability to produce state-of-the-art systems to

4

meet information age demands. As a result, our Nation's military weaponry and command and control systems have evolved to a high level of sophistication and complexity. These systems often require new skill sets, which are potentially perishable, and may require near constant reinforcement in order to prevent skill decay or loss of operational expertise. As we pursue the protection of our national interests, the scope and breadth of our commitments are of a pace and magnitude never before seen. This places an extremely high training burden on the Army and causes a continuous need for assessment and reassessment of our training architectures, needs, strategies and training mediums that can best support these requirements at the least cost and in remote locations. This situation is only exacerbated by an increased OPTEMPO and a period of austere and reduced Army resources – manpower, dollars, equipment, and time.

Despite these circumstances of reduced resources and increased mission complexity, the Army's leaders and commanders must devise institutional and unit level training programs that will lead to the effective training and education of our soldiers – training is the foundation and backbone on which the Army's success is built. Recently, in *Army Times*, Army Chief of Staff General Eric Shinseki was quoted as saying, "There is no better way to develop the sure knowledge and confidence required of America's most demanding occupation than a disciplined, focused commitment to a personal course of reading and study."[9] In concert with this view, is the need to find the time to train and study at the individual, unit, and institutional levels in order to master both the professional and technical skills required of today's leaders and soldiers.

Training initiatives such as distance learning provide a potential solution to today's training demands. Distance learning is a critical component of the Army transformation process and is at the cutting edge of the Army's transformation of training. It will enable the soldiers and leaders that operate and maintain advanced

state-of-the-art weapons and command and control systems, the opportunity to access and exploit training materials that facilitate successful mastery of the technical and multi-functional skills required to accomplish many of today's missions.

To take advantage of this potential, the Army must understand distance learning and its implications and solve the courseware design and development issues.


## DISTANCE LEARNING

## DEFINITIONS

What is open learning? What is distance learning? What is distance education? These various terms represent the current diversity of opinion within the field of distance learning, which is shifting the education paradigm from instructor/classroom-based instruction to learner-centric instruction. These terms, particularly distance learning and distance education, are often used interchangeably and will be throughout this paper, although there are schools of thought that reflect distinct differences. Distance education is usually considered to be a more deliberate and planned learning experience, often producing a degree/certification in a particular field. Distance learning, on the other hand, is viewed as providing brief exposure or acquaintance with a subject or myriad interests.

In *Distance Education: A Systems View*, by Michael Moore and Greg Kearsley, distance education is defined as "planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements."[10] As Figure 1 shows, a distance learning program is a total package fielding concept – a system of systems.

```
Sources ──────▶ Design ──────▶ Delivery ──────▶ Interaction ──────▶ Learning
                                                                     Environment
```

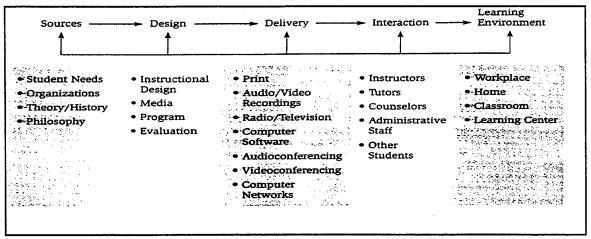| | | | | |
|---|---|---|---|---|
| • Student Needs | • Instructional Design | • Print | • Instructors | • Workplace |
| • Organizations | • Media | • Audio/Video Recordings | • Tutors | • Home |
| • Theory/History | • Program | • Radio/Television | • Counselors | • Classroom |
| • Philosophy | • Evaluation | • Computer Software | • Administrative Staff | • Learning Center |
| | | • Audioconferencing | • Other Students | |
| | | • Videoconferencing | | |
| | | • Computer Networks | | |

FIGURE 1. A SYSTEMS MODEL FOR DISTANCE EDUCATION

The American Council on Education describes distance learning "as a system and a process that connects learners with distributed learning resources. While distance learning takes a wide variety of forms, all distance learning is characterized by: 1) separation of place and/or time between instructor and learner, among learners, and/or between learners and learning resources; and 2) interaction between the learner and the instructor, among learners and/or between learners and learning resources conducted through one or more media; use of electronic media is not necessarily required."[11]

The United States Distance Learning Association specifies distance learning "as the acquisition of knowledge and skills through mediated information and instruction. Distance learning encompasses all technologies and supports the pursuit of life long learning for all. Distance learning is used in all areas of education including Pre-K through grade 12, higher education, home school education, continuing education, corporate training, military and government training, and telemedicine."[12]

The Department of Defense Strategic Plan for Advanced Distributive Learning, dated April 1999, delineates between learning, distributed learning, and advanced

distributed learning. Distributed learning is described as "structured learning that takes place without the physical presence of the instructor...and is enhanced with technology."[13] This technology may include correspondence course materials, audio/videotapes, CD-ROMs, audio/videoteletraining, interactive television, and video conferencing.[14] Advanced distributed learning expands on this definition by "leveraging the full power of the computer, information, and communication technologies through the use of common standards in order to provide learning that can be tailored to individual needs and delivered *anytime-anywhere*."[15]

The Department of the Army (DA) specifies distance learning as "the delivery of standardized individual, collective, and self-development training to soldiers and units at the right-place and time through the application of multiple means and technology."[16]

These are but a few of the definitions available in the distance learning arena. While none of the distance learning definitions are identical, there are common threads throughout. By any definition, a distance learning environment includes a systems process, the potential separation of student and instructor, and a significant involvement of various technological media. It should be emphasized that distance learning is not simply the employment of technology. Technology provides the means, but without a well thought-out training architecture, comprehensive understanding of how individuals learn, the effective design and development of courseware, and the identification of an appropriate administrative support structure – a distance learning program's success is questionable and its future uncertain.


HISTORY

Distance learning is not a new phenomenon. It has existed and evolved over the better part of 200 years, both within the United States as well as internationally. Today

there are several countries whose distance learning systems far exceed those of the United States.

As Figure 2 depicts, the first generation addresses correspondence courses, a style of learning that involves printed materials. The first documented correspondence course in the U.S. was in shorthand, followed by
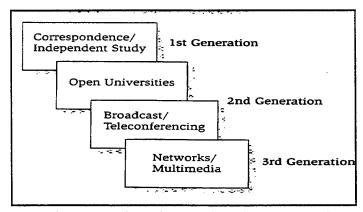


FIGURE 2. THE EVOLUTION OF DISTANCE EDUCATION

courses in both mine safety and railroad operations (1890s).[17] In 1906, the Calvert School of Baltimore became the first primary school to offer instruction by correspondence,[18] while in 1920, Columbia University became the first secondary institution to offer correspondence extension courses.

The second generation occurred in the 1920s and 1930s and involved the use of radio and television broadcasting for educational purposes. There was tremendous enthusiasm for these new mediums as evidenced by their use at Penn State College, Ohio State University, University of Wisconsin, and the State University of Iowa. The latter university offered five courses for credit via radio in 1925.[19] However, as time passed, television fared better due to corporate donations and grants for educational broadcasting. In 1952, cable television was born and in the early 1970s, several universities experimented with satellites as a broadcast mechanism. All of these technologies paved the way for future distance learning capabilities.

The establishment of Open Universities (OU) in the 1970's followed the advent of radio and television broadcasting. The direction taken by these universities involved a complete systems approach to the design, development, and execution of distance learning. While correspondence courses/printed media were a core component of the

9

curriculum, they also ventured into radio and television broadcasting and audiotapes as a distribution medium. In 1969, the British Open University was established as a fully autonomous, degree-granting institution and continues to serve as a very functional role model for similar programs throughout the world.[20] To date, the U.S. has nothing like it.

By the third generation, the use of computers, CD-ROMs, interactive CD-ROMs, multimedia, and Web-based training were well on their way to becoming the standard means for conducting distance education. These technologies provided the capability to incorporate very detailed visuals and graphics, interactive play, and near real time feedback. Key to these technologies is the proper implementation of the telecommunications infrastructure in order to network both computers and people (instructors/students) – in an effort to exchange information as well as promote interaction amongst the participants. This particular generation, in addition to developing technologies, will provide the means for being able to educate and learn virtually anytime, anywhere.


LEGISLATION

The Information Age, with its technological advances, gave promise for tremendous opportunity through automation and increased worker productivity. However, these opportunities also created an equal number of challenges that required resolution before they could be realized. One of these challenges was the need to develop new skill sets in order to function in this faster paced, digitally-based and networked working environment. A second and equally critical challenge was the desire/need to educate and train the work force in order to enable worker productivity and maintain pace with the number of fast-paced technological changes occurring in society.

10

In 1998, the Office of Science and Technology Policy (OSTP), in an effort to address these challenges consolidated several federal learning initiatives under the Federal Training and Technology Initiative (FTTI). The intent of FTTI is "to use the power of learning technologies to broaden the reach of educators and trainers who are faced with the daunting challenge of moving America's workforce into the Information Age."[21]

Shortly after this, in January 1999, Vice President Gore held a Lifelong Learning Summit. The purpose of this summit was to dialogue with industry leaders on what could be done to provide the means for training twenty-first century skills for twenty-first century jobs. The crux of the solution was a good education and the ability to learn for a lifetime.[22] The result was the establishment of an advisory committee of outside leaders to suggest training solutions, the provision of additional worker scholarships, the establishment of a fund to help train critical skill shortages, and the initiation of the 21st Century High-Skills Community Award.

Following on the heels of this summit and in an effort to provide command emphasis and the framework for a coordinated federal program, President Clinton signed Executive Order 13111 on January 12, 1999, titled "*Using Technology to Improve Training Opportunities for Federal Government Employees.*" This Executive Order created a federal training technology task force, as well as tasked DoD with the lead in developing learning technology standards. This was a collaborative effort between industry, other government agencies, and academia – their mission, to explore ways of providing better training opportunities, better training programs, and the necessary policies to support skilled and trained federal employees for the Information Age, as well as lifelong learning.

Besides being tasked as the lead in learning technology standards, the DoD was additionally tasked in the Strom Thurmond National Defense Authorization Act for

FY 1999 with "developing a strategic plan for guiding and expanding distance learning initiatives within the Department of Defense, to include a provision for the expansion of such initiatives over five consecutive years, beginning in FY 2000."[23]

In response to this tasking, the DoD provided *The Strategic Plan for Advanced Distributed Learning*, dated April 1999. This strategy consists of two parts – a strategy and an implementation plan – and is responsive to the OSTP, the National Partnership for Reinventing Government, Executive Order 13111, the direction from Congress, and the visions of the Secretary of Defense and the Chairman of the Joint Chiefs of Staff. It is designed to provide a framework to ensure that both military and civilian personnel have the training and skills necessary to achieve information superiority – "the gathering, processing, fusion, and dissemination of more accurate and timely information and knowledge, anywhere, anytime, every time."[24] Specifically, the plan requires the Services to evaluate how they execute their training missions and ultimately to reengineer how training is provided throughout the DoD. It changes DoD's learning paradigm from one that is classroom-centric to one that is learner-centric – to produce an environment that meets the Secretary of Defense's training technology vision "to ensure that DoD personnel have access to the highest quality education and training that can be tailored to their needs and delivered cost effectively, anytime and anywhere."[25]

There are several underlying principles and concepts upon which this vision is based and which must be considered as the Services execute their respective implementation plans. These are:

- Exploit existing network-based technologies.
- Create platform-neutral, reusable courseware and content to lower costs.
- Promote widespread collaboration to satisfy common needs.

- Enhance performance with emerging and next-generation learning technologies.
- Develop common framework that drives Commercial-Off-The-Shelf (COTS) product cycle.
- Establish a coordinated implementation process.[26]

With the DoD Advanced Distributed Learning Strategic Plan as guidance, the Department of the Army established its Distance Learning Program. This program consists of several components: Army Training XXI, the Total Army Distance Learning Program (TADLP), Classroom XXI, the Distributive Training Technology Project (DTTP), and the Reserve Education and Learning Program (REAL). These initiatives cover various aspects of distance learning to include individual, unit, collective, and reserve training requirements. Success is predicated on access to technology first, followed by courseware design and development. The installation of TADLP infrastructure is relatively straight forward and is based upon a two-phase approach. Phase I consists of limited capability distance learning classrooms composed of COTS hardware/software and the use of existing telecommunications infrastructure. Phase II "completes full-system implementation, to include: acquisition of the complete communications infrastructure, integration, and implementation of all interfaces needed to satisfy training requirements with joint, national, and international communications infrastructures."[27] The development of courseware is also relatively straight forward but its implementation is more difficult as it continues to be more art than science.

Distance learning in the Army is here to stay. The congressional legislation, DoD's Advanced Distributed Learning Strategic Plan, and DA's Distance Learning Program have provided both a direction and specific guidance. As previously stated, a well thought-out distance learning program is a "system of systems." Two key, mutually dependent components are hardware and software – the program cannot be successful

without both of them. Initial distance learning efforts in the three components focused on the hardware issues. Only now that the hardware issues have been resolved are the Army's technical gurus and educators beginning to realize that of these two, the software – courseware design and development – may be the more difficult requirement. Currently the AC, ARNG, and USAR state the lack of instructional courseware is their number one issue. Not withstanding the obvious oversight of the criticality of courseware to training and education, the Army needs to resolve the courseware issue expeditiously.

## COURSEWARE DESIGN AND DEVELOPMENT

What exactly is the generally accepted process for courseware design and development and are there things that could be done to improve the process in order to meet the training demand? The process of distance learning courseware design and development is addressed in a multitude of educational books and journals. This literature identifies the salient factors that must be considered if the Army is to produce effective and efficient courseware.

The design and development process is quite complex and involves much more than just automating an existing course. A widely accepted and frequently used approach to the development of instructional material is known as Instructional Systems Design (ISD). The basic steps are identified in Figure 3.
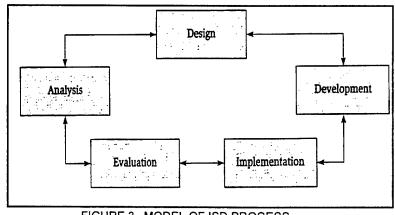


FIGURE 3. MODEL OF ISD PROCESS

"The fundamental principle of the ISD approach is that all aspects of learning and

instruction should be defined behaviorally, so what the student is expected to learn can be measured, and teaching can concentrate on the student's observable performance."[28] Key to the ISD approach is its systems perspective and its iterative nature. The process requires the distance learning team to conduct a thorough front-end analysis (FEA) in order to:

- Define the target audience,

- Define course goals and objectives,

- Identify course content,

- Identify media mix for the instruction,

- Produce the instruction and associated study guides,

- Determine how the student will be assessed,

- Identify how the effectiveness of the course will be evaluated,

- Identify costs involved in courseware production and maintenance.

The following sections explain the ISD developmental process.


ANALYSIS STAGE

TARGET AUDIENCE. Understanding the demographics, the motivations, previous learning experiences, outside influences and commitments, and supporting resources of the target audience are key to determining what material will be included in the lesson and how the lesson will eventually be constructed. According to Dr. Reginald Melton, a variety of questions should be asked: "What are the characteristics of those in the target group? What is their age range? What relevant knowledge and skills do they already possess? What sorts of abilities are included within the group? Are members of the group involved in, or have they been involved in, related education or training?"[29] Answers to these questions, as well as others, influence the ultimate design of the

course and provide the necessary insights to design a course that meets the needs of the learner.

The aggregate target audience for the Army's Distance Learning Program includes all Department of the Army military and civilian personnel of the AC, ARNG, and USAR.[30] A large percentage of younger military personnel today (AC, ARNG, USAR) have grown up with computers, Nintendo, and graphic intensive computer games enabling them to use many Web-based distance learning training programs, part-task training devices, and other table-top training devices supported by distance learning products. In addition, many of the ARNG and USAR personnel have civilian careers in the computer industry affording them an increased understanding of computers and automated training products and/or even the knowledge and ability to assist in the development of computer games, training products, and training aids. On the other hand, DoD civilians and many military leaders make up a comparatively aged workforce. They may or may not be required to use a computer on a daily basis or possess the skill or comfort level required to effectively use distance learning products to hone existing skills or develop new ones.

It is essential that the distance learning team develop a comprehensive knowledge of the specific target audience, incorporate multiple insights into their assessment of the audience and their needs, and then design the training architecture accordingly. Once the training team has developed a profile of the target audience, the team must decide what it is they want that audience to take away from the course.

DESIGN STAGE

AIMS AND OBJECTIVES/OUTCOMES

In the distance learning community, the goal of training is normally formulated as aims, a general statement of what the course should achieve, and objectives, more

specific statements of what the learner should be able to do or do better after completion of the material. By contrast, the Army uses task, conditions, and standards versus aim. There are several types of objectives: knowledge – demonstration of the knowledge the learner has gained, skills – demonstration of the learner's ability to apply their knowledge of the material, and attitude – beliefs and dispositions the instructor would like the learner to develop in respect to the course or lesson.[31] The Army uses enabling or terminal learning objectives as the root method of determining knowledge following training received and the ability to apply that knowledge at some later date.

Regardless of what terminology is used, it serves the same function of providing information to the student as to what is expected of him, under what conditions, and to what level of effort. Once the training team has developed the learning aims and objectives, what is the methodology used to develop a distance learning course, its content, and the manner in which the information is sequenced?


COURSE CONTENT

Oftentimes, a distance learning course is created from an already existing course. In this case, the FEA has already been accomplished and the course is produced with an appropriate media mix and distributed. If an analog version of the course does not already exist, it may be possible to adapt an existing course or to purchase or license a course that meets the requirements. As a last resort, a course can be designed from scratch. This option is obviously exceptionally labor and time intensive and is also the most expensive.

Once the decision has been made to adopt, adapt, or create a distance learning course, a thorough review of the applicable materials is undertaken. As a result, the material included tends to cover "what must be known" and eliminates the "nice to

17

know." The aims and objectives bound the content ensuring that as a minimum, the student is able to master the objectives.

INFORMATION SEQUENCING

Once course content is decided upon, the next step is to determine the sequencing of the course information. Sequencing is more complex than it initially appears. Traditionally information is sequenced in accordance with how the instructor learned it or based on how that type of information is usually taught, but this may not be the best sequencing methodology to use since learning is target audience dependent. According to Derek Rowntree, there are numerous sequencing options:

- "Topic-by-topic – study of a number of related themes which after an understanding of the overall purpose of the course could be studied in any order,

- Chronological sequence – happenings, events, or discoveries over a period of time are presented in the order in which they occurred,

- Place-to-place – talk about one place and work your way from place to adjacent place,

- Concentric circles – variant on place-to-place in which one "place" is included in the next,

- Causal – follows a chain of cause-and-effect for an event or phenomenon,

- Structural logic – certain topic cannot be learned without prior understanding of some other topic,

- Problem-centered – exploration of an issue or problem,

- Spiral – meet a concept again and again, each time at a more complex or demanding level,

- Backward chaining – teach the final step in the chain first and then the second to the last step, and so on."[32]

The key point to remember is that oftentimes a combination of these sequencing options will be used throughout a course or lesson based on the learning characteristics of the target audience. Once the course content is determined, what media is best suited to convey the content?

MEDIA TYPES/SELECTION PROCEDURES

This is, by far, the most difficult task during the ISD process since a number of factors impact decision-making – costs, technology/equipment availability, asynchronous (time delay) versus synchronous (real time) communications requirements, course stability, and what is to be accomplished – to identify only a few. This is true whether the media selected is to support conventional or distance learning training methods. Another factor is determining what media best supports the course objective at the level where training will occur. For example, a requirement to provide distance learning support to meet physical security training requirements at the individual training level, may be met by using something as simple as a CD-ROM. However, the selection process becomes more complex if these training requirements extend to an officer career course where interactive capabilities may be required to reach desired learning objectives. The "high tech" solution is not always the best answer and it requires an in-depth analysis to arrive at the most cost-effective media package. The media and technologies available to facilitate the distance learning process are depicted in Figure 4 while the strengths and weaknesses of each are shown in Figure 5. The following is a discussion of media most often used to convey training information.

PRINT. Print is the most common medium used and can take the form of textbooks, readings, briefings, manuals, course notes, and study guides among others. Printing is relatively inexpensive, production facilities are readily available, and product distribution can be made via printing plant, public mail, private delivery services, fax, or

| Print/Text | Voice/Audio |
|---|---|
| Textbooks | Telephone |
| Study guides | Voicemail |
| Workbooks | Audioconferences |
| Fax | Audiotape |
|  | Radio |
| **Computer** | **Video** |
| Email | Videotape |
| Web-based courses | Satellite delivery |
| Videoconferences | Microwave |
| CD-ROM | Broadcast video |
| Collaboration S/W | Desktop video |

FIGURE 4. DISTANCE LEARNING MEDIA TYPES

email. Print is one of the most versatile mediums and is used worldwide to support multiple communications and/or training requirements. Regardless of the media mix chosen, print is usually part of it.

VOICE/AUDIO. Audio (sound) is an excellent technology for augmenting and enhancing distance learning courses. Telephones are readily available and can be bridged in order to conduct a distance learning course via an audioconference. The ARNG recently conducted an administrative course using audioconferencing with stellar results.[33] Audiocassettes are also an excellent voice/audio product used for multiple purposes including audio teaching and/or instruction. This media is relatively inexpensive to produce. Its strength is the ability to capture large amounts of information on a cassette that may be used to augment or reduce the need for printed documents. As an augmenting tool, audiocassettes, in the absence of a platform instructor, can be used to provide verbal explanation of hard to understand concepts or theory, discussion of highly complex procedures, or amplify other information required to achieve desired learning objectives. Cassette players and audiocassettes may be found at home, in offices and automobiles, and in hand-held versions. Regardless of the type, this media can be used virtually anytime, anywhere. Additionally, there is a myriad of commercially

20

available audio courses that can be obtained off-the-shelf and offer the potential for conversion/incorporation into the design and development of a distance learning course. Lastly, audiographic systems permit the transmission of visual images either via fax or computer in support of voice instruction.

VIDEO/BROADCAST. Video provides the learner with the ability to "see and hear" instruction. This type media normally applies to videotapes, broadcast, narrowcast, microwave, cable, direct broadcast, and computers. Videocassette, like the audiocassette, is commonplace today. Video recorders can be found in most homes, libraries, schools, and businesses. Video, when used as a training media, enhances learning by affording the student the opportunity to view the information and if necessary, reinforce it through repeated review as often as time and opportunity permit. Television (TV) broadcasting is another very valuable visual mechanism, but it is considerably more expensive, schedule constrained, and does not offer the flexibility that other media provide. For example, the student must be available to view (TV) or to view/participate in the broadcast (desktop video/videoconferencing) at a particular date and time to maximize the learning experience. However, video-conferencing provides the most realistic training because it allows for synchronous versus asynchronous interaction and communication, while at the same time defraying travel costs and time away from home station. According to Adrian Kirkwood, video, television, and videoconferencing materials contribute invaluably to distance learning courses by, "providing learners with 'vicarious experience' by demonstrating complex processes or making possible visits to locations that would be too costly or too dangerous to achieve in any other way; it can use animation or adjusted speed techniques to demonstrate changes over time; it can be used for the direct teaching of ideas, processes, and procedures, or to present 'real life' case studies for analysis, or to act as a trigger to reflection and discussion among learners."[34] It is very important for the instructor to

21

ensure that the video technologies incorporated into their distance learning course include more than just a taped lecture – there must be additional value-added to maintain student interest.

COMPUTER-BASED/ WEB-BASED. The number of computers in our society continues to grow, and as a result, computers are receiving increased usage in meeting distance learning requirements. Computers can operate in a number of configurations – standalone, networked, or controlling multimedia workstations. Computer-based instruction refers to instructional materials that a student interacts with/uses on a standalone computer. Over the past several years, advancing computer and digital technologies have enhanced development of sophisticated, state-of-the-art interactive multimedia products. These advances have enabled both the civilian and military sectors to conduct collaborative training via networked computers. The primary medium of this technology is the CD-ROM capable of storing vast amounts of information in the form of words, sounds, pictures, animation, and video. In concert with this is the growth of the Internet and the World Wide Web (WWW). As people have become more familiar with the Internet and have gained an understanding of how using it can simplify as well as improve their lives, a demand for services related to Web-based training has increased. The computer technologies of today provide the instructor and student the means to interact either asynchronously or synchronously via email, instant messaging, list servers, chatrooms, and bulletin boards.

MEDIA SELECTION PROCEDURES. As stated above, a key contributor to the success of a distance learning course is the manner in which the course is structured, as well as the media mix chosen to convey the content. There are multiple ways to determine the proper media mix, but the core steps in "most media selection models consist of:

- Identify the media attributes required by the instructional objectives or learning activities.

- Identify the student characteristics which suggest or preclude certain media.

- Identify characteristics of the learning environment which favor or preclude certain media.

- Identify economic or organizational factors which may affect the feasibility of certain media."[35]

It is important to note that very rarely will a single media completely satisfy the course objective, but rather a mix of media provides the best means for meeting the learner's needs. This mix must be selected based on what information needs to be communicated to the student and in light of the strengths and weaknesses (Figure 5) of the available technologies and influencing organizational factors.

|  | Strengths | Weaknesses |
|---|---|---|
| Print | inexpensive<br>reliable<br>dense information<br>learner-controlled use | passive |
| Audio/video | dynamic<br>vicarious experience<br>visually/conceptually<br>dense information<br>learner-controlled use | development time/cost |
| Radio/television | dynamic pacing<br>immediacy<br>mass distribution | development time/costs<br>real-time use |
| Teleconferencing | interactive<br>immediacy<br>participative | complexity<br>unreliability<br>real-time use |
| Computers | multimedia<br>dynamic | equipment required<br>development time/costs |

FIGURE 5. MEDIA STRENGTHS AND WEAKNESSES Numerous steps in the courseware design and development process have been described in the preceding discussion, but how exactly is this work accomplished?

## DEVELOPMENT STAGE

Traditionally, teachers and trainers have worked alone and yet the distance learning environment encourages and often demands a team effort. There are several

team models that exist (the OU/Course Team, the Transformer Team, the Author-Editor Team, the Weekend Team) and can range in size from just a few people to a considerably larger group.

The OU/Course Team was pioneered by the British Open University and sets the standard for team models. It is comprised of numerous personnel of varying expertise, each serving a distinctive and important role in the overall course development and production. The subject-matter experts (SME) prepare text and record broadcasts; the educational technologists provide guidance regarding course content, objectives, media selection, assessments, and evaluations; the media specialists produce the audio/video broadcasts and design the computer graphics; the editors edit content; and the course manager provides organizational and leadership skills. This atmosphere enables the team to bounce ideas off each other, ensuring the course produced is correctly structured, with the appropriate media, providing the student with the greatest educational benefit.

The Transformer Team consists of the same type of personnel as the OU Team, but executes course production in two phases. In the first phase, the SME handle development of the distance learning materials. Once these materials are in draft, phase two is initiated with the transforming team converting them into a completed multimedia package. Developing courses under this model allows the SME to be released earlier in the development cycle, enabling them to return to teaching, research, or additional course production.

The Author-Editor Team model consists of a SME to provide the draft materials, while the editor produces the final document. This process tends to bypass several of the ISD steps and lacks the valuable insights provided by the instructional designer. Despite these drawbacks, it may have a role to play in the organization if there is a need to produce a product quickly and relatively inexpensively.

The Weekend Team is very similar to the Author-Editor team, consisting of SME and educational technologists. This model is favored when the distance learning course to be produced is not extensive and is primarily text oriented. It works best when the materials to be used are well defined and readily available.

Transitioning to this environment can be quite a challenge for the SME's as they adjust to others questioning, revising, editing, and publishing their course materials. Group dynamics are critical and it is important that healthy debate be encouraged while minimizing conflict. Regardless of the model used, it is imperative that the team be well led and the process of course development be agreed to prior to production.

EVALUATION STAGE

During the design and development process several activities are taking place; one of the most pertinent is deciding on how the student's learning will be assessed. This decision is an important one as it ultimately influences the layout and structure of the course. Once this decision is made, results from the assessment can provide both the student and instructor with information on the status of the student's learning, as well as point out course design areas that may require further evaluation.

Designing assessment into the course is crucial and can take two forms: formative and summative. Formative assessment "is designed to uncover where learners are experiencing difficulties or have an incomplete understanding, i.e. it is concerned with *how* learners understand a concept or procedure rather than how much they know or have achieved."[36] Self-assessment questions are a form of formative assessment and can provide students with a means to monitor their learning progress. This style allows the students to assess if they understand something and if not, to analyze why not. Summative assessment, on the other hand, consists of formally grading and recording the results and is designed to capture what the student knows, or

does not know about a particular subject. Assessment tools are many and can result in a physical product such as an essay, completed calculations, multiple-choice/matching tests, fill-in-the-blank tests, true-false tests, project reports, and drawings; or can be process-oriented resulting in an interview or demonstration/performance of a particular competence. The selection of the tool or combination of tools used depends on which one best demonstrates the student's progress towards either the lesson or course objectives. In the end, the assessment mechanism should be part of the learning experience and not something that is only experienced at completion.

Also taking place throughout the pre- and post- design process is a critical look at the course materials. This is an iterative process, and as products are developed, colleagues, peers, and other subject matter experts should review them for accuracy, completeness, and potential improvement. Comments and insights should then be considered for incorporation and the process conducted again. Once the course is complete, developmental testing with a group of learners is crucial. The results of the test should be thoroughly analyzed and changes made to the course materials if so warranted. Dependent on the magnitude of changes, the developmental test may need to be conducted again to assess the affect of the revisions. Following the conduct and conclusion of the course, an evaluation should again be made in order to assess the educational effectiveness of the instruction and instructional materials. This environment enables the course producers to collect data under real-life conditions via a larger audience. The tools used for data collection must be appropriately and succinctly designed in order to be useful to learners with limited time. The data provided might identify problems or issues that can be changed immediately, while others may have to wait until the course comes up for updating and revision.

It is evident that how a student's learning will be assessed is a critical piece of information necessary for determining the structure of a course and must be considered

26

early in the design process. The mechanisms used to make the assessment should be focused towards the lesson/course objectives and, if they are phased throughout the instruction, provide the distance learners with the ability to pace themselves and to monitor their progress towards course completion. Evaluation, on the other hand, should be an integral part of the course development process and needs to take place prior to course development, during course development, and following course presentation. It is much easier and less expensive to make changes to the instructional materials earlier in the process, following peer reviews and developmental testing, than later in the cycle.

## THE "COSTS" OF DISTANCE LEARNING

The cost of developing and producing distance learning materials can be quite expensive. The cost structure includes many elements: development (market research, authoring, piloting); production (word processing, editing, design, audio/video production, software/hardware, manuals, updating materials); presentation (storage, transmission, exams, evaluation); overhead (administration, facilities/utilities, records maintenance) – to name just a few.

The costs of a distance learning course can range from thousands to the millions of dollars. Course costs can vary considerably dependent on the quality of the product, the media mix used, and the specific form of development, production, and presentation method applied. How much to spend on design and development is tremendously influenced by the student load. The greater the number of students, the more willingness there is to make a significant dollar investment. The utilization of distance learning is much more cost effective given a large number of students as this affords the organization the ability to realize economies of scale.

27

On the other hand, distance learning can help the organization realize considerable cost savings. These savings take the form of reduced travel expenses, shortened course lengths, downsized facility requirements, and less time away from work and families. For the Army, distance learning affords the opportunity for soldier training with the means of starting and/or continuing education while maintaining a higher quality of life, greater unit flexibility in training, and enhanced readiness.

It was stated at the outset that the course design and development process is quite complex. As detailed, it involves a myriad number of steps, many of them taking place concurrently. The crucial point to remember is to design for the senses – sight, sound, smell, and touch. The development team wants to ensure it engages the learner and that the course is structured and sequenced to gain the learner's attention, provides information relevant to his/her needs, establishes and builds confidence, and satisfies expectations.[37] If these goals are accomplished, the student tends to learn and retain more, achieves the course objectives, and has a very positive distance learning experience. However, the design and development effort is bounded by the realities of cost, schedule, and performance. The production process can be a very intense and stressful period. The team's creative efforts are restricted by the budget, the courseware produced must meet the course objectives while operating and/or compatible within a variety of environments, and the schedule must be maintained. The Army, with careful consideration can reduce the courseware development timeline, improve unit cost, and better meet training demand.

## RECOMMENDATIONS

The Army's distance learning effort consists of numerous initiatives. Many of these initiatives use commercially available courseware, but even here the ongoing

28

development and production effort is behind schedule. The following recommendations identify several practices currently used in industry and draw on the author's experience with standards enforcement (Army Technical Architecture/Joint Technical Architecture) to provide ideas that would facilitate the timely, efficient, and effective development, production, and delivery of Army courseware.

1. The Army's distance learning courseware development effort must be adequately funded and the dollars restricted or fenced for this purpose. Courseware design and development is very similar to product/project/program management – a tremendous amount of work goes in upfront to design a solution that meets the requirements, is operationally effective and suitable, and is logistically supportable. A reliable funding stream is critical to this effort.

2. Courseware development and production must be standards-based rather than product-based. Enforcing this standardization requirement promotes both interoperability and compatibility between courseware and across platforms. The standards must be mature, approved, and recognized industry standards (Institute of Electrical and Electronics Engineers, Aviation Industry CBT Committee, Instructional Management Systems) that have seen commercial implementation. A consortium consisting of representatives from defense, industry, and academia have produced a specification known as SCORM (Shareable Courseware Object Reference Model), which has made tremendous strides towards the promotion of standards usage and standardization. The implementation of SCORM would allow courseware objects to be reused/shared and the courseware produced to be interoperable. The archiving and sharing of objects would enable courseware to be developed and produced more efficiently, since the military would not continually be reinventing the wheel or laboriously

modifying the same courseware based on changes in products and/or requirements. The ultimate effectiveness of a standards-based process is dependent on its enforcement, verification, and the requirement that all players be on the same sheet of music.

3. The content should be designed to a level of detail that allows the information to be easily archived to an open standards, non-proprietary database. This knowledge object capability provides the means for reusing content amongst several courses and enables rapid building, as well as updating of courseware. Additionally, the look and feel of the courseware can be separated from the content, also providing for efficient updating. Courseware developed and produced in this manner can easily be adjusted to meet the requirements of other organizations – again promoting standardization across the force as well as reducing unit cost.

4. Leverage the efforts of our sister Services and, where applicable, commercial industry. Another Service may have a course that either meets our existing requirement or could with some modification. For example, each Service uses and maintains High Mobility Multipurpose Wheeled Vehicles (HMMWV). Why does each Service need its own unique course for HMMWV maintenance? By coordinating, one Service could be given the lead to develop the core course with additional modules provided to meet unique Service requirements.

5. Leverage the capabilities of ARNG and USAR personnel. Dependent on their civilian occupations, some of these personnel will possess backgrounds and expertise in the areas required to develop and produce courseware – education, distance learning techniques, instructional design, information technology, and program management.

These personnel/units should be utilized, assigned courseware for production, and efficient review procedures established to approve/validate the courses submitted.

6. All courseware produced must be compatible with the Reimer Digital Library and the TADLP classrooms. Interface Control Documents must be written and/or enforced providing the standards necessary to ensure this compatibility/interoperability. A robust developmental test program could verify this compatibility requirement prior to courseware release.

7. The Distance Learning XXI contract should be modified to identify the appropriate standards required in the development and production of courseware. This contract should be centrally managed and mandated for any organization associated with or involved in distance learning courseware production.

8. The Training and Doctrine Command's (TRADOC) personnel structure has been tremendously impacted by the drawdowns. TRADOC requires additional personnel and should also examine restructuring the organization and/or outsourcing requirements. This effort must determine the correct mix of skills and personnel, both military and civilian, required to effectively execute and monitor the distance learning mission. This may entail the rewrite of civilian career fields to adjust/include programming, visual, information, educational, and training support technologists as they relate to the distance learning environment. It is critical to establish teams, as well as to have an individual assigned to each team that understands the entire process, the media, and the big picture in terms of the overall courseware development strategy.

## CONCLUSION

"As we work toward our transformation goals, more than ever we realize the cornerstone to our vision and successful transformation is our investment in our most precious resource—our people."[38]

Today's soldiers for the most part tend to be well motivated, disciplined, and computer savvy, hence adapting to a distance learning environment should be relatively easy. On the other hand, the military is an organization that is very tight-knit and team-oriented, a condition that is often developed during education/training opportunities and scheduled exercises. Distance learning, while providing the same education and training opportunities, does so with the soldier potentially separated from his/her fellow soldier and/or instructor/leader. As a result, the courseware package must take this into account and be designed to provide a curriculum that is both interactive and if possible, builds rapport in the absence of the instructor/leader.

Courseware design and development involves more than just producing a course of instruction. Critical to the success of the material is an understanding of the psychology of how soldiers/individuals learn, an assessment of how much learning the soldier achieved, and an evaluation as to the effectiveness of the course. In addition to effective courseware, several other components are critical to a distance learning program's success: study guides/instructor guides and a tutor/mentor program. The study guide provides the soldier with an overview of the course, its objectives, associated dates, evaluation requirements, and contact information. The instructor guide provides the instructor with course specifics, how to operate the equipment, evaluation criteria, and administrative requirements. The tutor/mentor program provides on-the-ground personnel who can assist the soldier with issues and concerns. These two elements are extremely important facets of a distance learning program because they help the soldier remain connected during the instruction.

The purpose of this paper has been to focus the reader's attention on distance learning, specifically courseware design and development; and how the use of this technology could increase the technical capabilities of the Army's soldiers, leaders, and civilians by providing them with the opportunity to continue their education or improve their skills while they serve, regardless of the geographical area, mission, or component. With finite resources and the tremendous investment in the Army's transformation process, the Army's Distance Learning Program is critical to success. It lies at the core of the changing education/training paradigm and provides a means for ensuring that our soldiers, leaders, and civilians are able to hone both their professional and technical skills for a digitized and complex battlefield.

# ENDNOTES

[1]Eric K. Shinseki, "The Army Transformation: A Historic Opportunity," <u>ARMY Magazine</u>, October 2000, 22.

[2]Office of the Secretary of Defense, <u>Annual Report to the President and the Congress</u> (Washington, D.C.: Office of the Secretary of Defense, 2000), 173.

[3]Louis Caldera and Eric K. Shinseki, <u>A Statement on the Posture of the United States Army, Fiscal Year 2001</u>, Posture Statement presented to the 106th Cong., 2d sess. (Washington, D.C.: U.S. Department of the Army, 2000), 37.

[4]Ibid., 2.

[5]Ibid.

[6]Louis Caldera, "Investing in People: The Key to Transforming the Army," <u>ARMY Magazine</u>, October 2000, 16.

[7]John L. Sehon, "Post Schools in the Army," <u>Journal of the Military Service Institution</u> 14 (May 1892): 523.

[8]U.S. Army Training and Doctrine Command, Army Training Support Center, "Fact Sheet: Historical Outline of Army Correspondence Course Development," Fort Eustis, undated.

[9]Diane Tsimekles, "Book List Pumps Up Professionalism," <u>Army Times</u>, 24 July 2000, p. 18.

[10]Michael G. Moore and Greg Kearsley, <u>Distance Education: A Systems View</u> (Belmont: Wadsworth Publishing Co., 1996), 2.

[11]Defense Technical Information Center, "Distance Education," available from <http://stinet.dtic.mil/special/distance1.html>; Internet; accessed 30 September 2000.

[12]United States Distance Learning Association, "Research Information and Statistics," available from <http://www.usdla.org/04_research_info.htm>; Internet; accessed 15 November 2000.

[13]U.S. Department of Defense, "Department of Defense Strategic Plan for Advanced Distributed Learning," 30 April 1999; available from <http://www.adlnet.org>; Internet; accessed 6 October 2000.

[14]Ibid.

[15]Ibid.

[16]Defense Technical Information Center, "Distance Learning Resource Handbook," available from <http://stinet.dtic.mil/special/dlresorc.htm>; Internet; accessed 10 December 2000.

[17]Moore and Kearsley, 20.

[18]Ibid., 22.

[19]Ibid., 27.

[20]Ibid.

[21]U.S. Department of Defense, "Department of Defense Strategic Plan for Advanced Distributed Learning," 30 April 1999; available from <http://www.adlnet.org>; Internet; accessed 6 October 2000.

[22]Al Gore, "Lifelong Learning Summit," January 1999; available from <http://www.adlnet.org/library/docs/lifelonglearning.html>; Internet; accessed 13 January 2001.

[23]Public Law 105-261, Strom Thurmond National Defense Authorization Act for Fiscal Year 1999, 112 Statutes, sec. 378 (1994).

[24]U.S. Department of Defense, "Department of Defense Strategic Plan for Advanced Distributed Learning," 30 April 1999; available from <http://www.adlnet.org>; Internet; accessed 6 October 2000.

[25]Ibid.

[26]Mark Oehlert, "Advanced Distributed Learning," briefing slides with verbal commentary, Alexandria, ADL Co-Laboratory, 8 January 2001.

[27]U.S. Department of Defense, "Department of Defense Strategic Plan for Advanced Distributed Learning," 30 April 1999; available from <http://www.adlnet.org>; Internet; accessed 6 October 2000.

[28]Moore and Kearsley, 102.

[29]Reginald F. Melton, Objectives, Competences & Learning Outcomes (London: Kogan Page Limited, 1997), 52.

[30]U.S. Army Training and Doctrine Command, "The Army Distance Learning Program Systems MANPRINT Management Plan," 27 August 1999; available from <http://www.tadlp.monroe.army.mil/manprint.htm>; Internet; accessed 11 September 2000.

[31]Derek Rowntree, Teaching Through Self-Instruction, 2nd ed. (London: Kogan Page Limited, 1990), 46.

[32]Ibid., 62-65.

[33]Craig Bond, "Distributed Learning," briefing slides with verbal commentary, Alexandria, ARNG Headquarters, 11 October 2000.

[34]Fred Lockwood, ed., <u>Materials Production in Open and Distance Learning</u> (London, Great Britain: Paul Chapman Publishing Ltd, 1994), 65.

[35]Moore and Kearsley, 97.

[36]Lockwood, 137.

[37]David Birdwell, Senior Instuctional Designer, Department of Distance Education, U.S. Army War College, interview by author, 18 December 2000, Carlisle Barracks, PA.

[38]Louis Caldera, "Investing in People: The Key to Transforming the Army," <u>ARMY Magazine</u>, October 2000, 15.

# ACRONYM LIST

| | |
|---|---|
| AC | Active Component |
| AICC | Aviation Industry CBT Committee |
| ARNG | Army National Guard |
| CD-ROM | Compact Disk-Read-Only-Memory |
| COTS | Commercial-Off-The-Shelf |
| DA | Department of the Army |
| DoD | Department of Defense |
| DTTP | Distributive Training Technology Project |
| FEA | Front-End Analysis |
| FTTI | Federal Training and Technology Initiative |
| HMMWV | High Mobility Multipurpose Wheeled Vehicle |
| IEEE | Institute of Electrical and Electronics Engineers |
| IMS | Instructional Management System |
| ISD | Instructional Systems Design |
| OPTEMPO | Operational Tempo |
| OSTP | Office of Science and Technology Policy |
| OU | Open University |
| REAL | Reserve Education and Learning Program |
| SCORM | Shareable Courseware Object Reference Model |
| SME | Subject Matter Expert(s) |
| TADLP | Total Army Distance Learning Program |
| TRADOC | Training and Doctrine Command |
| USAR | United States Army Reserve |
| WWW | World Wide Web |

# BIBLIOGRAPHY

Abrams, John N. "Training and Doctrine Command Supports Army Transformation."
ARMY Magazine, October 2000, 73-80.

Anderson, T.D., and D.R. Garrison. "Transactional Issues in Distance Education: The
Impact of Design in Audio-Teleconferencing." The American Journal of Distance
Education 9, no. 2 (1995): 27-45.

Army Science Board. Ad Hoc Study Final Report: Use of Technologies in Education and
Training. Washington, D.C.: Army Science Board, December 1995.

Association of the United States Army. Army Budget Fiscal Year 2001: An Analysis.
Arlington: Institute of Land Warfare, 2000.

Barry, Michael, and Gregory B. Runyan. "A Review of Distance-Learning Studies in the
U.S. Military." The American Journal of Distance Education 9, no. 3 (1995):
37-47.

Bingham, John, Teresa Davis and Cathy Moore. "Emerging Technologies in Distance
Learning." Available from <http://www.horizon.unc.edu/projects/issues/papers/
Distance_Learning.asp>. Internet. Accessed 20 December 2000.

Birdwell, David, Senior Instuctional Designer, Department of Distance Education, U.S.
Army War College. Interview by author, 18 December 2000, Carlisle Barracks,
PA.

Bond, Craig. "Distributed Learning." Briefing slides with verbal commentary.
Alexandria: ARNG Headquarters, 11 October 2000.

Bramble, William J., and Barbara L. Martin. "The Florida Teletraining Project: Military
Training Via Two-Way Compressed Video." The American Journal of Distance
Education 9, no. 1 (1995): 6-26.

Brigham, David E. "Factors Affecting the Development of Distance Education Courses."
Distance Education 13, no. 2 (1992): 169-192.

Brown, Stephen C., ed. Open and Distance Learning: Case Studies from Industry and
Education. London, Great Britain: Kogan Page Limited, 1997.

Caldera, Louis. "Investing in People: The Key to Transforming the Army." ARMY
Magazine, October 2000, 15-18.

Caldera, Louis, and Eric K. Shinseki. A Statement on the Posture of the United States
Army, Fiscal Year 2001. Posture Statement presented to the 106th Cong.,
2d sess. Washington, D.C.: U.S. Department of the Army, 2000.

Collis, Betty. Tele-learning in a Digital World. Boston: International Thomson Computer
Press, 1996.

Computer Sciences Corporation, Distance Learning XXI Contractor. Interview by author, 12 January 2001, Hampton, VA.

Cosumano, Joseph. "What Senior Leaders Are Saying: Transforming the Army to a Full Spectrum Force." Available from <http://www.army.mil/armyvision/senior_leaders.htm>. Internet. Accessed 23 September 2000.

Davis, Jerome. "Reserve Education and Learning." Briefing slides with verbal commentary. Crystal City: OCAR Headquarters, 11 October 2000.

Defense Technical Information Center. "Distance Education." Available from <http://stinet.dtic.mil/special/distance1.html>. Internet. Accessed 30 September 2000.

Defense Technical Information Center. "Distance Learning Resource Handbook." Available from <http://stinet.dtic.mil/special/dlresorc.htm>. Internet. Accessed 10 December 2000.

Durica, Rosemary A. "The Effects of Change in the Transition from Traditional Training Methods to Training Delivered by Technological Methods on Military and Civilian Education and Training Specialists in Selected Military Training Organizations." Ph.D. diss., Texas A&M University, 1999.

Eckert, Gregory, and James Phillips. "Digital Training: The Way Ahead." ARMY Magazine, August 2000, 29-32.

Ellis, Larry R. "The Transformation Campaign Plan: The Tool to Transform the Army." ARMY Magazine, October 2000, 123-128.

Ellis, Larry R. "Distance Learning Laydown to the DCSOPS." Briefing slides with verbal commentary. Washington, D.C.: Pentagon, 20 November 2000.

Executive Order 13111. "Using Technology to Improve Training Opportunities for Federal Government Employees." 12 January 1999. Available from <http://www.pub.whitehouse.gov/uri-res/l2...:pdi://oma.eop.gov.us/1999/1/13/5.text.2>. Internet. Accessed 29 September 2000.

Gaddy, Carol A. Training Through Technology: Distance Learning Is More Than Hardware. Strategy Research Project. Carlisle Barracks: U.S. Army War College, 14 April 2000.

Gore, Al. "Lifelong Learning Summit." January 1999. Available from <http://www.adlnet.org/library/docs/lifelonglearning.html>. Internet. Accessed 13 January 2001.

Harrison, Nigel. How to Design Self-Directed and Distance Learning Programs. New York: The McGraw-Hill Companies, Inc., 1999.

Institute for Defense Analyses. Distance Learning and the Reserve Components. Washington, D.C.: Institute for Defense Analyses, December 1996.

Jans, Megan. "Insights...On Transforming Today's Army." <u>Base Camp Briefs</u>, September 2000, p.4-5.

Jong, Ton de, and Luigi Sarti, eds. <u>Design and Production of Multimedia and Simulation-based Learning Material</u>. Dordrecht, The Netherlands: Kluwer Academic Publishers, 1994.

Kaufman, Roger. "If Distance Learning Is The Solution, What's The Problem? Beyond DDSS." Available from <http://www.ed.psu.edu/acsde/deos/deosnews/ deosnews5_8.asp>. Internet. Accessed 4 December 2000.

Lawson, Warren G., and David Raes. "Iowa: A Test Bed For Our Future." <u>ARMY Magazine</u>, January 2000, 27-29.

Lischke, Maureen. "Transforming The Force With Innovative Instructional Technologies And Methodologies." <u>ARMY AL&T Magazine</u>, March-April 2000, 50-51.

Lockwood, Fred, ed. <u>Materials Production in Open and Distance Learning</u>. London, Great Britain: Paul Chapman Publishing Ltd, 1994.

Matthews, William, Distance Learning Officer, U.S. Army Training and Doctrine Command. Interview by author, 11 January 2001, Fort Eustis, VA.

Melton, Reginald F. <u>Objectives, Competences & Learning Outcomes</u>. London: Kogan Page Limited, 1997.

Minoli, Daniel. <u>Distance Learning Technology and Applications</u>. Norwood: Artech House, Inc., 1996.

Moore, Michael G.,and Greg Kearsley. <u>Distance Education: A Systems View</u>. Belmont: Wadsworth Publishing Company, 1996.

Oehlert, Mark. "Advanced Distributed Learning." Briefing slides with verbal commentary. Alexandria: ADL Co-Laboratory, 8 January 2001.

Office of the Secretary of Defense. <u>Annual Report to the President and the Congress</u>. Washington, D.C.: Office of the Secretary of Defense, 2000.

Plewes, Thomas. "What Senior Leaders Are Saying: Address to the Reserve Officers Association." 25 January 2000. Available from <http://www.army.mil/armyvision/ reserve_vision_address.htm>. Internet. Accessed 23 September 2000.

Price, Robert V., and Judi Repman. "Instructional Design for College-Level Courses Using Interactive Television." Available from <http://www.ed.psu.edu/acsde/deos/ deosnews/deosnews4_5.asp>. Internet. Accessed 4 December 2000.

<u>Public Law 105-261</u>. <u>Strom Thurmond National Defense Authorization Act for Fiscal Year 1999</u>. 112 Statutes, sec. 378 (1994).

Race, Phil. <u>The Open Learning Handbook</u>. East Brunswick: Nichols Publishing, 1994.

Ragan, Lawrence. "Good Teaching Is Good Teaching: An Emerging Set Of Guiding Principles And Practices For The Design And Development Of Distance Education." Available from <http://www.ed.psu.edu/acsde/deos/deosnews/Deosnews8_12.asp>. Internet. Accessed 4 December 2000.

Rowntree, Derek. Preparing Materials for Open, Distance and Flexible Learning. London: Kogan Page Limited, 1994.

_____. Teaching Through Self-Instruction, 2nd ed. London: Kogan Page Limited, 1990.

Schreiber, Deborah A., and Zane L. Berge. Distance Training. San Francisco: Jossey-Bass Inc., 1998.

Sehon, John L. "Post Schools in the Army." Journal of the Military Service Institution 14 (May 1892): 522-534.

Shinseki, Eric K. "The Army Transformation: A Historic Opportunity." ARMY Magazine, October 2000, 21-30.

Shuchman, Lisa. "Teaching the Troops." 4 September 2000. Available from <http://www.thestandard.com/article/display/0,1151,18136,00.html?nl=dnt>. Internet. Accessed 23 September 2000.

Siemieniec, Jack. "Reserve Chief Outlines His Vision." 27 January 2000. Available from <http://www.dtic.mil/armylink/news/Jan2000/a20000127plewesvision1.html>. Internet. Accessed 23 September 2000.

Tsimekles, Diane. "Book List Pumps Up Professionalism." Army Times, 24 July 2000, p. 18.

U.S. Air Force Research Laboratory. Interactive Multimedia Distance Learning (IMDL). Brooks Air Force Base: United States Air Force Research Laboratory, January 1999.

U.S. Army Training and Doctrine Command. "Total Army Distance Learning Program Master Plan Overview." 1996. Available from <http://www-dcst.monroe.army.mil/adlp/distancelearning/master/chapters/overview.html>. Internet. Accessed 11 September 2000.

U.S. Army Training and Doctrine Command. "The Army Distance Learning Program Operational Requirements Document." 27 August 1999. Available from <http://www.tadlp.monroe.army.mil/ord1.htm>. Internet. Accessed 11 September 2000.

U.S. Army Training and Doctrine Command. "The Army Distance Learning Program Systems MANPRINT Management Plan." 27 August 1999. Available from <http://www.tadlp.monroe.army.mil/manprint.htm>. Internet. Accessed 11 September 2000.

U.S. Army Training and Doctrine Command. The Army School System (TASS). TRADOC Regulation 350-18. Fort Monroe: U.S. Army Training and Doctrine Command, 26 May 2000.

U.S. Army Training and Doctrine Command, Army Training Support Center. "Fact Sheet: Historical Outline of Army Correspondence Course Development." Fort Eustis, undated.

U.S. Department of the Army. "The Army Vision." Available from <http://www.army.mil/armyvision/armyvis.htm>. Internet. Accessed 23 September 2000.

U.S. Department of Defense. "Department of Defense Strategic Plan for Advanced Distributed Learning." 30 April 1999. Available from <http://www.adlnet.org>. Internet. Accessed 6 October 2000.

U.S. Department of Defense. "Department of Defense Implementation Plan for Advanced Distributed Learning." 19 May 2000. Available from <http://www.adlnet.org>. Internet. Accessed 6 October 2000.

United States Distance Learning Association. "Research Information and Statistics." Available from <http://www.usdla.org/04_research_info.htm>. Internet. Accessed 15 November 2000.

Winkler, John D., and Paul S. Steinberg. Restructuring Military Education and Training. Washington, D.C.: RAND, 1997.

Yarger, Rich, Chairman, Department of Distance Education, U.S. Army War College. Interview by author, 18 December 2000, Carlisle Barracks, PA.